

Course on Integrated Waste Management for a Smart City
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Module 11
Lecture No 53
E-Waste Management

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Okay, hello and welcome, so this is we are now moving towards the last topic. So this course as I said in the very beginning, in the introduction video as well as during the first week when we are going over the details of the course, we started the focus of this course is on as you know is on looking at the waste management for a potential smart city, smart city initiative the government of India has taken, as well as the Swacch Bharat Mission initiatives.

So the whole object of this course was to get people updated, get people know what is waste management? How it is relevant? What are the different components of waste management? So the bulk of the material and bulk of the subject matter that we discussed in this course was on municipal solid waste management and that too focused on the urban we did not covered that much on the rural area we did not go into great detail about say landfill design. We did some over view design for landfill as well as composting waste to energy, what are design components and all that.

Then we did construction and demolition waste which is also a very relevant topic when we talked about urban waste management urban for all these ULB's specially if you look at the 100 smart cities if that we are going we are building and we are going to build. So municipal

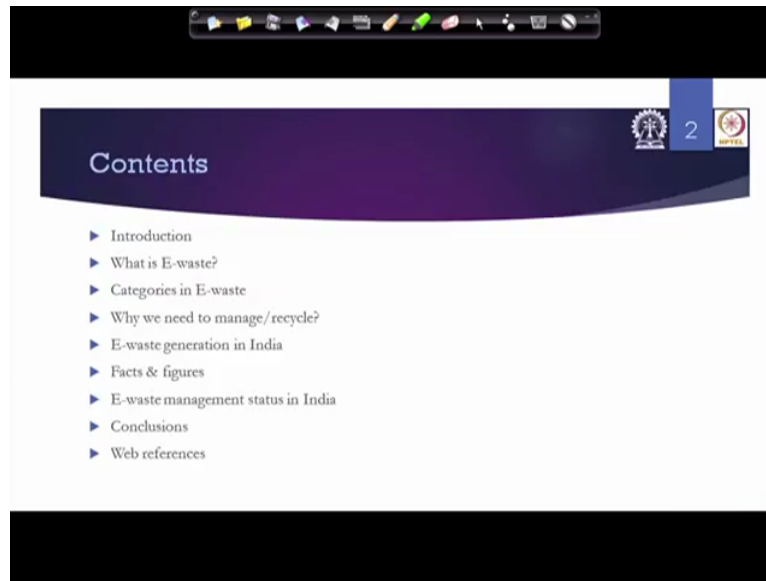
solid waste which gets most of the attention that is why we spent 8 weeks there and there are lot of different components. Approximately two weeks was spent on construction and demolition, slightly less than two weeks if you look at the number of videos was on C and D waste management.

Now we are in the towards the end, the last component that I wanted to discuss in this course was on electronic waste management. Again this will be more like an overview maybe in future will try to have a detailed course at least small course on e-waste management which we will let you know if we are going to offer that.

So let us get started on electronic waste and this again mostly will be centred around the Indian situation, I will give you an overview of what is happening in India, we will talk about the e-waste management rules in India. Then I will also give you some general information on why we should be worried about electronic waste management, what are the health impact, what are the environmental impact, what are the different components out there and how it is defined in other places in the world and also will talk about little bit on recovery of certain rare earth metals and all that.

So just those things more will be in the overview, we will cover a lot in terms of focused on Indian scenario, as well as the e-waste management rules. Say as you know, last year, the government has revised many of the rules related to the waste management. Municipal solid waste management; we covered that, C and D waste; we also covered that, now we are going to cover on the electronic waste. So that is kind of most there are some other rules out there, biomedical, plastic waste I am not going to cover that in this course for sure, but maybe in future we will see how that works out.

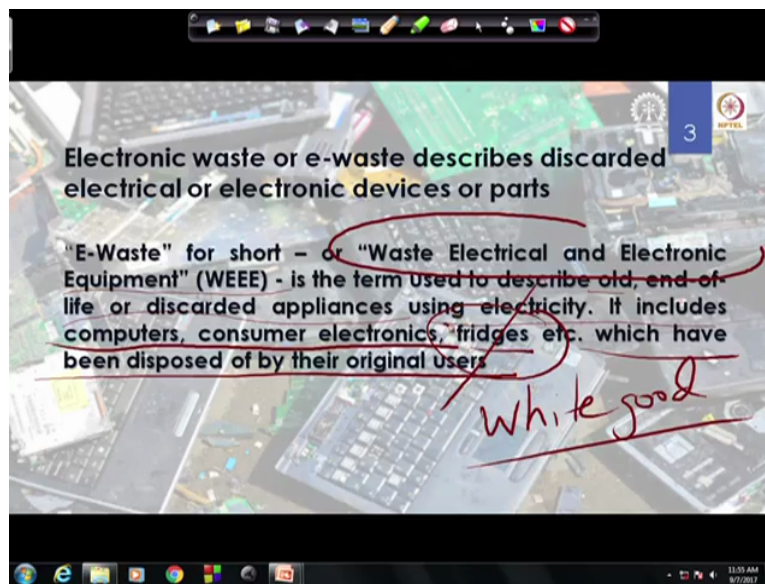
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So, let us look at the e-waste management in India, so that is the focus for this video and in terms this video I will talk about first of all we will look at what is e-waste, what are the categories in e-waste, why we need to manage e-waste, why we need to recycle, what is the how much e-waste is generated in India and how the generation rate is changing actually it is growing exponentially not only in India but globally as well.

Then some facts and figures in terms of different types of e-waste that is growing in the country. We also getting some e-waste coming from abroad to India that is we will talk about that as well. And status of e-waste management, what is the present status we will talk we will conclude, we will a look at some of the websites, references, I will also give you some of the list of stuff that is working sorry the companies that are working on e-waste management in the country.

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So what is e-waste? If you look at this slide, I have tried to define here and this is a European Union definition from European union they call it WEEE, so or in many times we call it, WEEE. So e-waste for short is waste electrical or electronic equipment as you can see waste electrical or electronic equipment WEEE. So that is why WEEE Waste Electrical and Electronic Equipment is a term used to define any old end of life, or discarded electronics, discarded appliances using which uses electricity.

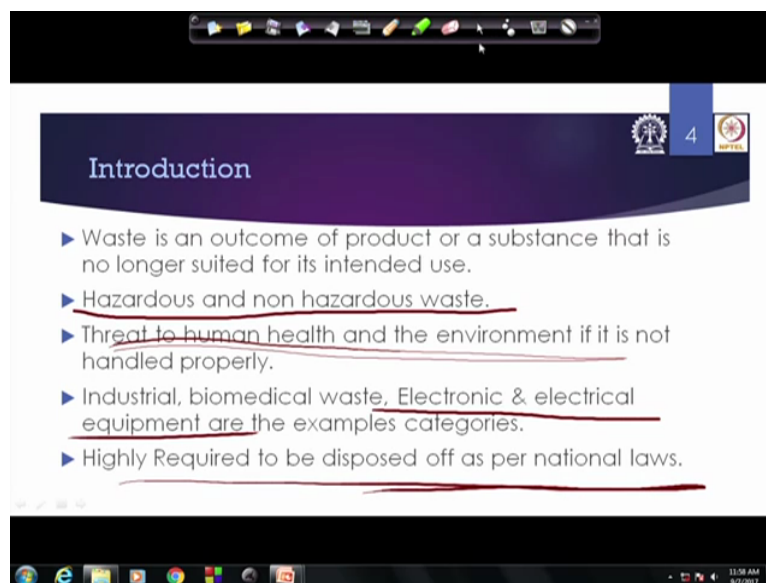
So, anything which uses electricity that is included in e-waste. It includes computers, it includes consumer electronics, fridges, refrigerators which have been disposed by the original user, so that is how they have defined e-waste. If you go to US the definition changes a little bit, this even you look at US, this fridge part, that is does not it is not gets into electronic waste they call it white goods, why they call it white good, because if you remember all the refrigerators or dishwasher or your washing machines, all of them use electricity, isn't it? even the microwave.

So most of these when they initially came out they were white in colour, now they come in multiple colours. Now, you go and walk into any refrigerator shop you will find them in multiple colours, some of them are steel, some of them are black, some of them red lot of flowery pattern and all that, but initially if you remember and if you just think a little bit back like 10 years ago or 15 years ago, when these refrigerators first came most of them use to be white or maybe little bit off-white, so that is why they are being called white goods.

Somebody just put the name white goods and that is how it is being used. So if you are in US they will call it a white good. So and that is not included in electronic waste definition, so this is those, but in if you are in Europe, they are included in electronic waste definition. So you need to be careful like and we will talk about how it is what is define in India when we go to the e-waste management rules in India too, we follow more in US rather than Europe and so you will see that.

So whenever you look at electronic waste you first of all need to know, what is what are the stuff we are calling it electronic waste. Number one thing we talked is look about the electronic waste is off course the computers. So the desktop computers, nowadays even laptops and one of the streams which is growing very fast is the mobile phones. Mobile phones which is lot of mobile phones are coming into the disposal stream globally and all including in Indian scenario, so this is the how it is define.

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The image shows a screenshot of a presentation slide titled "Introduction". The slide is numbered "4" in the top right corner. It contains a list of five bullet points defining waste and its categories. The text is as follows:

- ▶ Waste is an outcome of product or a substance that is no longer suited for its intended use.
- ▶ Hazardous and non hazardous waste.
- ▶ Threat to human health and the environment if it is not handled properly.
- ▶ Industrial, biomedical waste, Electronic & electrical equipment are the examples categories.
- ▶ Highly Required to be disposed off as per national laws.

So in terms of waste, off course waste is an outcome of product or substance that is no longer suited or intended use, so we talked about that. Waste is whenever you discard something, say you have a cell phone, you have a mobile which you are not using anymore, but you are just keeping it in your drawer you are not throwing it away it is not a waste, it is a product, it is a material.

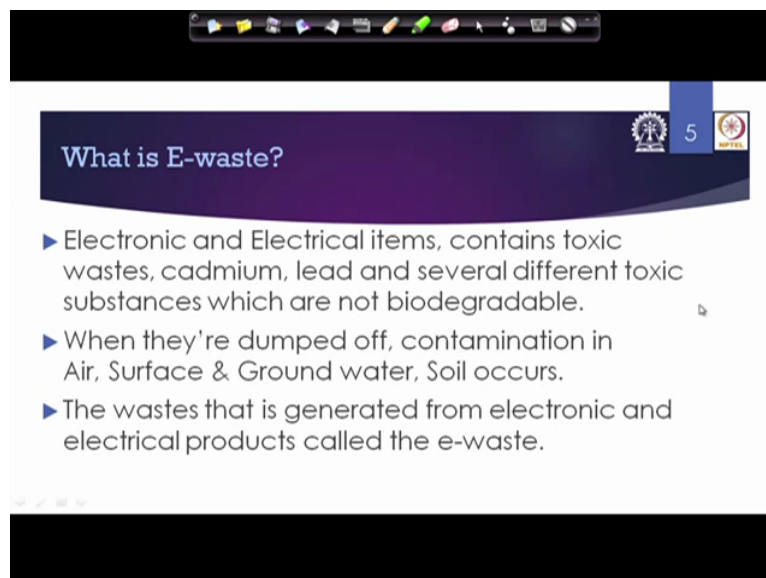
The day you decide, so before Diwali or something you want to clean up and then you have a very old cell phone you see that this is probably have no value at all now this I will just throw it away, so when you decide to throw it away, at that point it becomes waste, until then it is

actually a product, whether in use or whether may not be in use. In your houses you may have several of these old phones which you are not using anymore, but still they are just sitting there and because you may think that I will use it in future or I may sell it to somebody kabadiwalas and all that. But unless you throw it away, it is not the waste once you throw it away, it becomes a waste.

So there are hazardous and non-hazardous waste we talked about that. In electronic we do have some hazardous waste as well, so we do have hazardous waste showing up in electronics as well. And then the major concern that we have a threat to human health and environment, so this is if you do not handle it properly we have a threat to human health and environment, so that is a bottom-line concern.

And there are different types of waste, industrial, biomedical electronic, Electrical equipment are example categories. We are focused on Electrical and electrical equipment for do this lass for this video and the subsequent videos. Then and then it is off course it requires you have to follow the national laws, will talk about the national laws in terms of in terms of this electronic waste.

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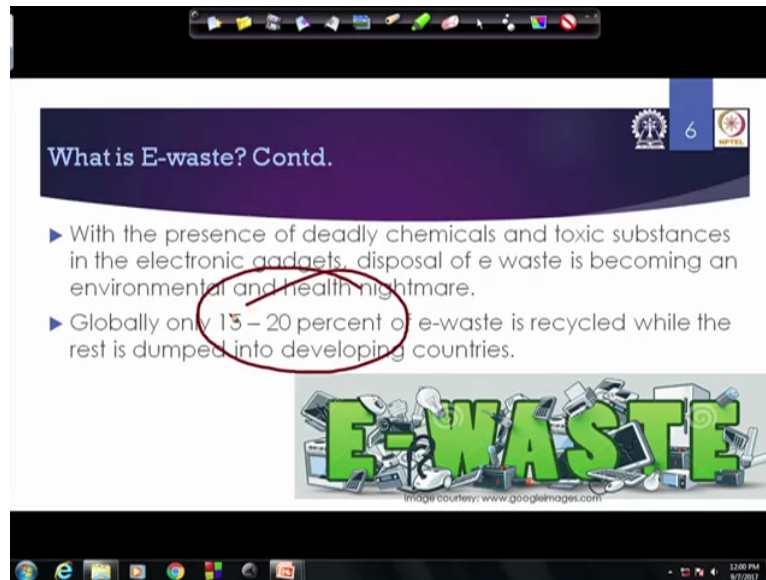
What is E-waste?

- ▶ Electronic and Electrical items, contains toxic wastes, cadmium, lead and several different toxic substances which are not biodegradable.
- ▶ When they're dumped off, contamination in Air, Surface & Ground water, Soil occurs.
- ▶ The wastes that is generated from electronic and electrical products called the e-waste.

So, what is e-waste? It is electronic, electrical items which is containing toxic waste, it may have cadmium, lead several different toxic substances which are not biodegradable, most of it are not biodegradable, there could be cadmium, there could be lead, there could be some traces of arsenic, we will look at those of stuff. When they are dumped off they contaminate soil, they contaminate air, they contaminate surface and groundwater. And the waste that is

generated from electronic and electrical products are called e-waste, so this is what we have that waste from electronic and electrical product that is call an e-waste.

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The image shows a screenshot of a presentation slide. The slide has a dark blue header with the title "What is E-waste? Contd." in white. Below the title, there are two bullet points in blue text. The first bullet point says "With the presence of deadly chemicals and toxic substances in the electronic gadgets, disposal of e waste is becoming an environmental and health nightmare." The second bullet point says "Globally only 15 – 20 percent of e-waste is recycled while the rest is dumped into developing countries." The number "15" in the second bullet point is circled in red. Below the text is a 3D illustration of various electronic waste items like a laptop, a monitor, and a printer, with the words "E-WASTE" written in large, green, block letters. At the bottom of the slide, there is a small text credit: "Image courtesy: www.googleimages.com". The slide is shown within a window that has a Windows taskbar at the bottom and a Windows taskbar at the top.

So you may hear term e-waste. E-waste is a very popular topic in the country, many times you see in the newspaper articles and other articles at least you should be aware that what is e-waste, what is actually we are trying to. So what is the with the presence of deadly chemicals and toxic substances in these electronic gadgets, disposal of e-waste is becoming an environmental and health nightmare.

So it is a big problem and you go to any again I keep on telling you that you can go on YouTube and look at off course this course also you are watching on YouTube, but you can go on YouTube and there are lots of videos out there on improper e-waste management and again within in India as well. So you see that that e-waste is not being managed properly so that how this e-waste managed by informal sectors in a very crude way just to get little bit of money they are actually risking their health risking their life.

So globally only have 15 to 20 percent of e-waste is recycled while the rest is dumped in developing countries and in developing countries that also not being managed properly. It is being recycled, that is why we call it, but that is not really recycling you are trying to get little bit of gold, little bit of copper out of that, but in the process you are contaminating the air, you contaminating the soils and sediments around the that so-called recycling plants.

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The slide is titled "Categories in E waste" and is slide number 7. It lists three categories of electrical and electronic equipment:

- ▶ Large household appliances.
Refrigerator, freezer, washing machine & other appliances.
- ▶ Small household appliances
Vacuum cleaners, watches, grinders, etc.
- ▶ IT and telecommunication equipment
PCs, printers, telephones, etc.

A red circle highlights the "IT and telecommunication equipment" category and its examples. A small video inset of a man is visible in the bottom right corner of the slide.

So there are different categories in electronic waste. Electrical and electronic equipment they can be categorised into large household appliances that is what you have is refrigerators, freezers, those are your large household appliances. So large household appliances is it is there this refrigerator, freezers, washing machine those are your other appliances. Then you have the small like vacuum cleaners, watches, grinders and those kind of stuff, then you have IT and telecommunication like PCs, printers, telephones, cell phones all those are your this will another category of electronic waste.

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The slide is titled "Categories in E waste..." and is slide number 8. It lists four categories of electrical and electronic equipment:

- ▶ Consumer equipment
TV, radio, cam, amplifiers etc
- ▶ Lighting equipment
CFL, High intensity Sodium lamp.
- ▶ Medical devices
Radiotherapy equipment, cardiology, dialysis, nuclear medicine, etc.
- ▶ Automatic dispensers
For hot drinks, hot & cold bottles

A small video inset of a man is visible in the bottom right corner of the slide.

Then you have consumer equipment like TV, radio, cam, amplifiers. Lighting equipment, CFL, high-intensity sodium lamp, medical devices, radiotherapy equipment, cardiology,

dialysis. Automatic dispensers like for hot drinks, hot and cold water bottles so all these whichever has some circuit board, if they have a circuit board and if they use electricity it is an e-waste, so that is what it is all about.

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So in terms of some pictures of large household appliances, do you see these are the categories of large household appliances which is there. Then we have information and communication technology equipment's, you have telephones, printers and mobile phones, copying equipment, scanners, Xerox machines and all those becomes your information and communication, so ICT, that is we hear most of the time ICT equipment's. Consumer electronics your shaver, even hair dryer, some different types of stuff that you use those are all toasters, coffee machines, clocks, watches, hair dryer, shaver, etc. those are personal consumer electronics those are again also electronic waste.

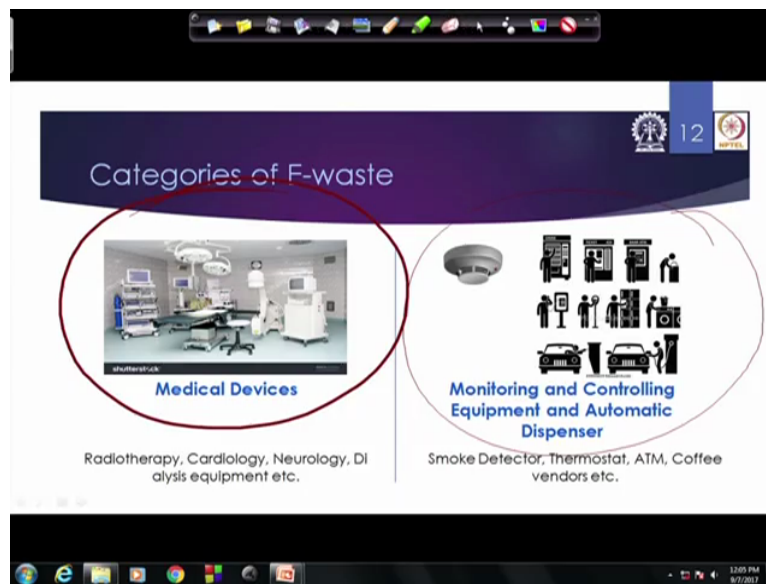
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So there are as you can see we use lots of appliances, lots of things which does follow under like a in terms of electronic waste. So there are, so categories of e-waste, the different type like these are the and then you have large household or small appliances, we talked about that. Even the electrical and electronic tools that is also used that is also it is will be different types of tools, that also comes under electronic waste. Then consumer equipment, TV, radio, lightning equipment, toys, Leisure and sports equipment all these are part of electronic waste.

So if you think about you after watching this video if you look at your just around your house, if you are watching it at your home or if you go back to your home whenever you go to just look at all the stuff that you have you will find potential electronic waste everywhere in your house, because the way we are working these days we use many of these electronic and electrical appliances at our houses. And so we have a potential of producing a lot of electronic waste and that is why electronic waste volume or the quantity is increasing quite exponentially throughout the globe.

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Medical devices, again those are electronic waste so those again is used these also electronic waste medical device whenever you walk into a medical, recently I had to take my dad had some X-Ray and CT scan and all that, so you as you walk into any of these X-Ray centres or where they do all these image analysis you will everyone room you find fancy machine, so but so all these machines when they were discarded they will be also an electronic waste.

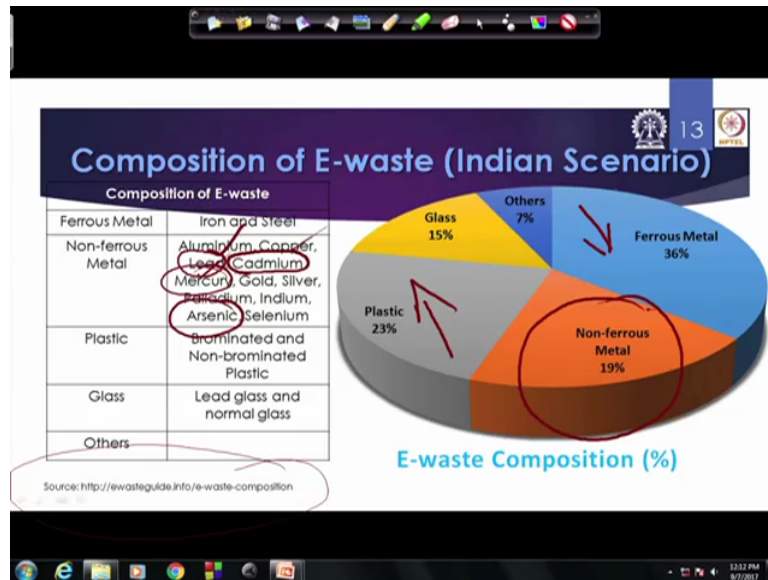
So we have and then we have monitoring and a controlling equipment, so all your fire detectors, your automated like ATM machines different types of vending machines, even when you go in a parking lot if you are using that you put your you push the button and it gives you parking ticket so it tells you at what time you are coming into the parking lot and then when you will go out you can again you will have to pay.

So while you are coming in you may not see anybody there, it is no attendant just you need to press a button, like a green button my times and a slip comes out. So that again also a electronics, so that is also electronics and electrical equipment. So when it goes bad, that also becomes an e-waste.

So if you think about there are so many stuff, even the petrol pump dispenser where you see all those petrol like we see on the screens like how much petrol we are getting and what is the price per litre that are again has anything which has circuit board has some sort of display unit and so essentially having some circuit board which it becomes it is an electronics and electrical item and when they are gone bad, when it cannot be used anymore, it becomes an

electronic waste. So as you can see there are variety of things which comes under this category.

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So in terms of the Indian scenario, what is there in our e-waste? So that is in Indian scenario what are the stuff that is there in the e-waste. So we do have some ferrous metal, we have non-ferrous metal, there is a plastic, glass and then the others lot of organic and other stuff present there. So in terms of ferrous, off course iron and steel, you see ferrous around 36 percent.

One thing if you have noticed over the years ferrous content is actually going down, so ferrous content is going down in terms of what is showing up in electronics for that if you just think about this one if you remember from when you are a small child if you had a desktop at home, you had a CPU and you had a monitor, monitor was the CRT monitor the big one, and then if you had to carry this you need at least one person to carry the monitor and the other person to carry the CPU.

Now everything is so compact, everything is so small just one person can hold it and carry it wherever they want to. Why? Because we are off course it is become smaller at the same time earlier we use to use lot of iron in those, it used to be lot of ferrous metal used to be present, so that is an heavy, now we are using more and more plastics. So things are bit going from iron to plastic, and since plastic is lighter, things are becoming lighter.

Think about the laptop as well, older laptop used to be heavy and but now you can find lots and lots of laptop which is very-very light even lighter which usually very lighter laptop you

will not have a CD-ROM, but these days even you can find some laptops which has a CD drive CD-ROM drive, but at the same time is very light as compared to what you used to have earlier.

So we are getting rid of ferrous and we are getting more and more on plastics. So here, if you this came from one of the e-waste guide produced in the country on the source is over here which you can crosscheck as well. So now we are going more and more into non-ferrous or plastics, so you will find that things will actually go down in this pie and things will like actually start going up in this pie. So if there is a newer study, you will see that less ferrous metal and more plastic showing up.

So and then we have some non-ferrous metals, non-ferrous metals is the one which is actually in term ferrous it is iron, we know iron, we do need some iron if we actually many people who are anaemic given iron supplement, but at the same time too much iron is also bad, so you do not want too much of iron. But in terms of the environmental impact that we worry about, we think about mostly is we are focusing on the non-ferrous metal.

So non-ferrous metal which what are those non-ferrous metal? We have aluminium, aluminium is there, copper, lead, cadmium, mercury, so if you think about the like the bad one, the nasty ones, the lead, cadmium, mercury, arsenic, so these are these are known like we know about them, there is lot of studies have been done from different sources where these elements, these metals have tried to go into the environment and they have created contamination and created problem in terms of like a soil contamination, water contamination and all that.

So this is what we are, lead gets the most of the attention specially lead, because lead we use a lot, lead-base order. If you have used the soldering iron, lead base order is very popular, we are getting rid of lead and we are using some other metals now, but lead is still is there in electronics. Mercury is also present some of the newer ones are actually getting rid of mercury, so, mercury is also going away now, but we do have the stuff shows up in the waste disposal stream will still have mercury for at least a decade or so.

So these are important stuff, cadmium, iron, arsenic, so these are all there in the electronic waste. Then in the plastic, there is a brominated and non-brominated plastic, brominated plastic is what you hear a lot about brominated flame retardants. Now what is this flame retardants? Flame retardant as the name suggest it is it retards the flame.

Now what was that mean? Retarding the flame means if you have if you use the laptop, laptop as the name suggest laptop, so you have to put it on the lap and work there, so that is why the name is laptop but if you are using the laptop on your lap it is not a very good idea, there are a lot of research have been done, you should not actually although it says laptop but suppose you are you should keep it away from your lap.

But, say if you had experience the laptop working with the laptop you know that after say few may be half an hour or one hour or one and half hours, depending on how good the laptop is, you will see that the machine is getting heated up. So once the machine gets heated up, it can potentially catch fire because there is so many plastics and other things are there which can potentially burn.

So to reduce the fire chances they use what is known as the flame retardant, so to reduce the chance of fire. So the brominated flame retardants are very common and that is they are called BFR's, so brominated flame and then when we have brominated flame retardants we with those mostly plastic material that we have so that is why you see plastic in terms of brominated and non-brominated, so there are some brominated plastics and non-brominated.

Glass, there are some lead glass or the normal glass. Lead glass which means there are some lead is there, especially lead glass is used. Say if you have a CRT lead glass is used as a sealed, so you have a sealed in the front which lets the like we can see the image on the TV or the screen but the seal prevents although harmful rays coming and affecting us, so that is why lead is used.

If you go for an x-ray, say if you somebody is getting an x-ray or even you are getting an x-ray and then they want you see that they put you a jacket on top and or that jacket thing has it seems very heavy, it has lot it has lead. Lead actually prevents the harmful rays for affecting the part of the body for which the x-ray is not being taken because if x-rays is being taken only the part of the body where the x-ray needs to be taken, that is the only is exposed another part of the body is covered with a jacket which contains lot of lead and it is you can feel the heaviness of the jacket as well.

So that is why the lead is used a lot in electronics and all these whenever you have all these screens, lead is there in the background to prevent these harmful rays coming out and hitting us in getting us affected. So but these days again we are getting rid of lead and lead using other material there as well, so but lead is still there in electronics.

So this is these are ones why we should worried, what is so I wanted to show that what is there and why we need worry about, we will talk little bit more individually how these metals, why they are bad, because again, anything you learn, I keep on saying that maybe in every video but it is okay for me, that anything you learn we should always think about why, why, why always ask questions.

And we use to do that when we were small kids, like if you have small kids in the house, you may have seen, every they have lots of questions. But unfortunately our education system in the school they have been by like with the stick they have been like so much they get so much afraid that they stop asking questions and they have been bombarded with so much homework and this and that the curiosity dies and they just becomes bookies worm and they start doing study like that.

Which is and we saw for actually the critical thinking suffers and by the time they come to places like IIT, we think that they will be very they have come to IIT they should be very bright they are bright, but I am not saying the students are not bright but they are bright but they are lacking the critical thinking ability they do not really want to think, everybody wants a recipe, ready-made stuff and then just go do the exams get a good grade, but grades are okay, but knowledge is what will take you further. So you need to think, you need to ask questions, ask questions every time and that is ask questions on discussion forum, we will be happy to answer your questions.

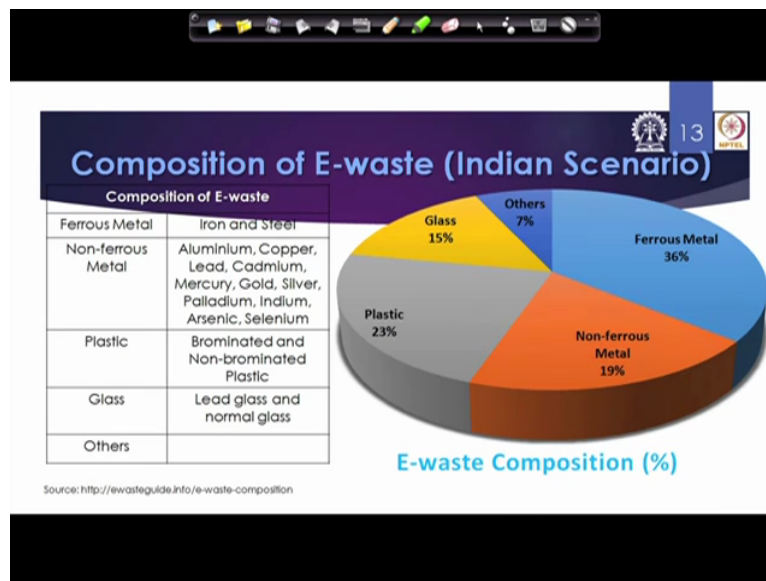
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Material	Large Household Appliance	Small Household Appliance	ICT & Consumer Electronics	Lamps
Ferrous Metal	43	29	36	-
Non-ferrous Metal	27.67	26.19	9	14.3
Plastic	19.31	37.75	30	3.7
Glass	0.02	0.16	19.3	77
Others	10	6.9	5.7	5
Total	100	100	100	100

Source: "E-WASTE IN INDIA", RESEARCH UNIT (LARRDIS), RAJYA SABHA SECRETARIAT, NEW DELHI, JUNE, 2011

So composition of e-waste again same thing has been put here for a breakup of different types of component. So if you have large household appliances, small household appliances, ICT and lamps, so these 4 categories as you can see this is again came from a document which was submitted to Rajya Sabha earlier. So this is e-waste in India, research unit had which was in Rajya Sabha Secretariat.

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So in terms of the composition of e-waste, here you see the ferrous metal. So in terms of composition of waste in the Indian scenario was same if you from the previous slide, what now the next this next slide what you have done is previous slide was the summary of all these different appliances, different types of categories. Here the same the information has been broken down broken down to large household appliances, small household appliances, ICT, as well as lamps.

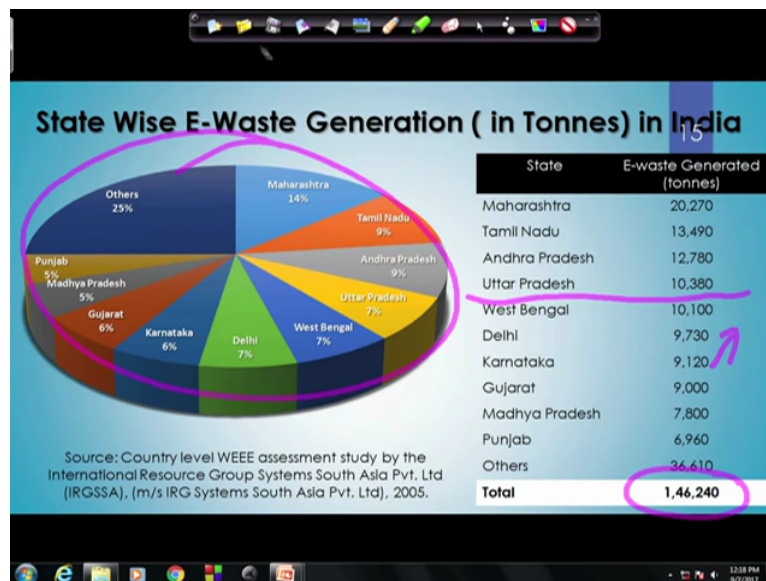
So if you those are the 4 categories we are looking at and for that we have if you look at the categories, as ferrous metals, in terms of large household appliances, we see more ferrous, that needs more structurally it has to be robust, is not it? If you think about large household appliance, refrigerators, washing machines or this those anything like big refrigerators, huge big refrigerators, even freezers, so they have you go and in any you go to a ice cream shop you see those chest freezers, freezers which is kept at the bottom and open like this and those kind of materials, so those have more ferrous metal.

As you go to the small household appliances, it is less, consumer electronics kind of in the in that area. Non-ferrous again plastics in the small household appliances you see more and

more plastic we see more plastic showing up there and ICT and consumer electronics we see more glass which is kind of obvious and same thing with the lamps, you we have more glass in the lamps, lamps means the bulbs.

And also in ICT like if you look at your phone you have some all these computers, laptop, always you we have glass there and there are other components out there as well also. So ferrous, non-ferrous, plastic, glass, those are the major ones. Non-ferrous is the one which we always worry about in terms of this environmental and human health impact.

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So and then where it is generated the most, so one thing what we have seen so far is we looked at how much electronic waste is produced (())(26:30) sorry we looked at what is electronic waste, how is defined and then we looked at what are the different categories like big large appliances, small appliances, subcategories of what type of material is there in each of the category and we start looking at from the Indian context how the different categories look like, there distribution.

And so we know like this electronic waste, the type of electronic waste and all looks at the quantity, how much electronic waste actually gets produced in India. And again this came from this is an old data and I it is not a very latest data, but it is based on percentagewise things may not have changed that much we do need to have newer data coming up in Indian scenario, unfortunately it is not the newer data is not much out there.

So in terms of the most the number one state is produces the most electronic waste is Maharashtra. Maharashtra produces nearly 14 percent of electronic waste produced in India.

So you have Maharashtra producing the most then Tamil Nadu, Andhra Pradesh, Uttar Pradesh, West Bengal, Uttar Pradesh essentially remember the Noida and Ghaziabad, which have lot of we have lot of IT companies there as well, so and Uttar Pradesh is a big state. So then we have West Bengal, Delhi, Karnataka, Karnataka will actually may have gone up little bit.

Gujarat, Madhya Pradesh, Punjab and then the others produces the, so total e-waste generated was 145240 tons, but this is again as I said this is an old data, now newer data will be much-much higher. So and this is how it gets for the different states that we have which produces electronic waste. So different state wise Tamil, Maharashtra leads the pack and then Tamil Nadu, Andhra Pradesh and others also not too far behind.

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City	E-Waste Generated (in Tonnes)
Mumbai	11017
Delhi	9730
Bangalore	4648
Chennai	4132
Kolkata	4025
Ahmedabad	3287
Hyderabad	2833
Pune	2584
Surat	1836
Nagpur	1769

Source: Country level WEEE assessment study by the International Resource Group Systems South Asia Pvt. Ltd (IRGSSA), (m/s IRG Systems South Asia Pvt. Ltd), 2005.

In terms of you go by the city in tons, city Mumbai seems to be leading the pack, then Delhi, Bangalore, Chennai, Kolkata, Ahemdabad, Hyderabad, Pune, Surat, Nagpur. So Mumbai is Mumbai, Delhi is kind of in the high, then we have others following it up. Delhi, it could be the NCR region as well we do not know. So many times Delhi people include Ghaziabad, Faridabad, Noida, Gurgaon all as a NCR National capital region, so it could be combination of all four as well. Nehru Place itself has lot of electronics activity there as too so.

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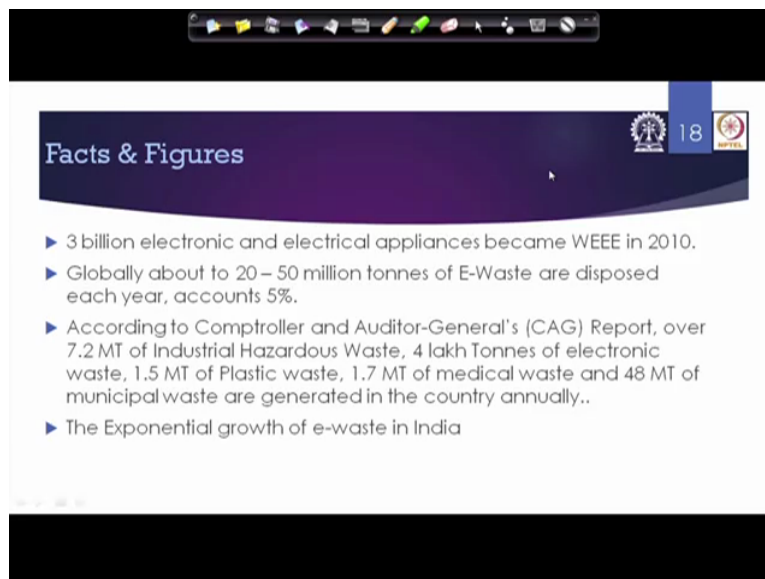


Then e-waste growth in India, if you look at in terms of how the e-waste is growing it is growing quite dramatically as you can see. It is from 2005 and this is projected to 2025, so we are somewhere year 2017 and this was done in based on data collected in 2014. So from 2014 India was the fifth largest reducer, so this graph is a combination of some of the data collected from this document from 2005 and then some of the newest information that has been included to projected up to 2025.

So we see that highest per capita e-waste generation state is Delhi and the lowest is Bihar. And India is the fifth biggest e-waste producer in the world and we are may be already going up in that was in 2014. Discarding 1\$7 million tons of electronic and electrical equipment's is 2014, now three years ago, so I am not sure what is the what is the, even if your fifth it is pretty lot of electronic waste that is showing up for our country.

And as you can see from 2015, 2005 to 2025 if we believe this projection, we were at around 15 then it is 185, so how much like 10 and then another 35, so nearly 20, 12 times, more than 12 times increase of electronic waste in over 20 years. So we need to build lot of infrastructure in the country to managing this electronic waste, because electronic waste needs to be managed so that there is a environmental impact and the human health impact is less.

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The slide is titled "Facts & Figures" and features a dark blue header with a white mouse cursor. In the top right corner, there are logos for IIT Bombay and IIT Madras, along with the number "18". The main content consists of four bullet points:

- ▶ 3 billion electronic and electrical appliances became WEEE in 2010.
- ▶ Globally about to 20 – 50 million tonnes of E-Waste are disposed each year, accounts 5%.
- ▶ According to Comptroller and Auditor-General's (CAG) Report, over 7.2 MT of Industrial Hazardous Waste, 4 lakh Tonnes of electronic waste, 1.5 MT of Plastic waste, 1.7 MT of medical waste and 48 MT of municipal waste are generated in the country annually..
- ▶ The Exponential growth of e-waste in India

So again this much in terms of 2010, 3 billion electronic and electrical item becomes a waste. Globally about 20 to 50 million tons of e-waste are disposed each year, which is around 5 percent of the waste stream. According to CAG report over 7.2 million tons of industrial hazardous waste, 4 lakh tonne of electronic waste, 1.5 metric ton of plastic waste and 1.7 tons metric tons of medical waste and 48 tons medical waste generating in country annually, which is just couple of years data back, there is a exponential growth of e-waste in India.

So this topic is very important actually to understand and in in terms of your like a problem in the e-waste. E-waste is a is becoming a big problem in country like ours and needs a drastic kind of action and solution. So will talk about what are the rules and other stuff in this like overview of material that will cover over this next several videos.

So with that let us stop here at for this particular video, so we covered up to facts and figures, so give you some idea about what is going on in India sorry about how much e-waste is being produced in India and things associated with that. So in the next video we will start thinking about why we even need to worry about e-waste? Why we should even discuss this topic? Why, what is the health effect? What is the environmental effect? So we will do that in the next.

Again any question, feel free to put it on the discussion board, we will be very happy to answer that. We will do at during this electronic waste coverage our goal is to again to ask you some questions, so there will be you will have your regular weekly assignment, but in addition there will be another quick assignment where we want you take on how e-waste is

managed in your town or your city. Is there any how you are managing it, your e-waste that is produced, because we want to know that and based on the responses we get, I hope we get responses from each one of you.

You are more than 6000 people registered for this course, so if you can get it there will be really nice to get that response and to at the end of this course as I said I will have a extra video. We will talk about both municipal solid waste and electronic waste, how what is the scenario in India based on data that you provide. So we will send you a Google form on this as well and look forward to your support to collect that data which will be really helpful for us to know in this course as well. So thank you and I will see you in the next video.